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COMPARISON STUDY BETWEEN THE STATSPIN[®] EXPRESS 3 CENTRIFUGE AND THE STATSPIN EXPRESS 2 CENTRIFUGE

Sponsored At:
Norwood Hospital,
Norwood, Massachusetts

Comparison Study Between the StatSpin[®] Express 3 Centrifuge and the StatSpin Express 2 Centrifuge

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Purpose

The StatSpin Express 3 is a high-speed bench top centrifuge used to rapidly produce plasma and serum from whole blood contained in original collection tubes. The Express 3 holds 8 tubes up to 10 mL and has pre-set cycle times of 2, 3, and 5 minutes. This study examined chemistry, coagulation, and residual platelet count testing on samples centrifuged in the Express 3 as compared to the Express 2.

Materials and Methods

Chemistry:

Two lithium heparin PST tubes (BD, 13 x 75 mm, plastic) and two serum tubes (BD, 13 x 75 mm, plastic) were collected from 20 individuals and centrifuged in the Express 3 (3 minutes, 7200 rpm) and the Express 2 (3 minutes, 8500 rpm). The plasma was tested for glucose, BUN, creatinine, albumin, total protein, calcium, uric acid, total bilirubin, LDH, CPK, alkaline phosphatase, SGPT, SGOT, GGPT, amylase, Na, K, CL, CO₂, CKMB, and troponin using the Beckman Lxi. The Access 2 was used to test TSH and T4 using serum.

Coagulation and Residual Platelet Count:

Two sodium citrate tubes (BD, 13 x 75 mm, plastic) were collected from 20 individuals and centrifuged in the Express 3 (2 minutes, 7200 rpm) and the Express 2 (2 minutes, 8500 rpm). The plasma was tested for PT, PTT, and D-Dimer using the bioMerieux MDA. Residual platelets were measured using the Bayer Advia.

Interpretation

Chemistry:

Samples spun in PST tubes for only 3 minutes in the Express 3 exhibited complete separation of plasma and cells. All analytes have acceptable correlation between the Express 3 and Express 2. (Troponin results range from 0 - 0.02 ng/mL, with most results = 0 ng/mL, and therefore are not included in the calculations.) Correlation coefficients (r) range from 0.796 to 1.000. P values (paired t-test, two-tailed) for all analytes except TSH (p = 0.02) are greater than 0.05, indicating there is no statistical difference in means between the two centrifuges. Mean absolute percent biases range from 0.6 % to 17.2 %. Table 1 includes a summary of descriptive statistics. Data are presented in Table 2 and Chart 3.

Coagulation and Residual Platelet Count:

PT, PTT, and D-Dimer have acceptable correlation (r = 0.944 - 0.986). All p values are greater than 0.05. Mean absolute percent biases range from 1.1 % to 33.4 %.

The percent of results with a platelet count less than 10,000/ μ L is 78 % for Express 3 as compared to 85 % for Express 2.

Discussion

For all 26 analytes tested, these data indicate similar results for Express 3 as compared to the Express 2. Express 3 is ideal for rapid plasma for coagulation testing, sample preparation for STAT chemistry, and cardiac profiles in the ER. Express 3 provides faster turnaround times and greater productivity for the laboratory.

Table 1.1 Statistical Summary

	SSX3 Mean	SSX2 Mean	SSX3 SD	SSX2 SD	Corr. Coeff.	P value	Mean Abs % Bias
Glucose	97	98	15.8	17.9	0.983	0.269	2.0
BUN	14	14	3.0	2.9	0.989	1.000	1.3
Creatinine	0.8	0.8	0.12	0.12	0.881	0.267	4.4
Albumin	3.9	3.9	0.53	0.52	0.993	1.000	1.0
T. Protein	7.2	7.2	0.41	0.42	0.974	0.815	1.1
Calcium	9.4	9.5	0.50	0.49	0.983	0.481	0.6
Uric Acid	4.5	4.5	1.01	1.04	0.997	0.419	1.1
T. Bilirubin	0.7	0.7	0.21	0.22	0.806	0.519	17.2
LDH	137	135	26.3	26.6	0.954	0.318	4.5
CPK	99	99	58.2	58.3	1.000	0.592	1.4
Alk. Phos.	61	61	16.4	15.6	0.973	0.861	5
SGPT	24	23	5.0	5.0	0.979	0.527	3.2
SGOT	22	22	11.3	11.5	0.996	0.186	4.2
GGPT	20	19	13.2	13.0	0.981	0.545	12.1
Amylase	77	76	20.5	20.3	0.996	0.392	2.1
Na	138	138	1.9	1.5	0.815	0.841	0.6
K	3.9	3.9	0.33	0.35	0.928	1.000	2.3
Cl	103	103	2.4	2.1	0.796	0.761	1.1
CO2	27	27	1.8	1.7	0.923	0.748	1.3
TSH	1.98	2.04	1.393	1.371	0.998	0.018	5.3
T4	8.39	8.23	1.791	1.929	0.979	0.083	4.7
CKMB	1.8	1.8	1.03	1.04	0.997	0.606	2.2
Troponin	0.00	0.00	0.005	0.004	0.455	1.000	11.1
PT	12.1	12.0	0.70	0.68	0.975	0.126	1.1
PTT	27.1	27.0	2.33	2.30	0.986	0.343	1.2
D-Dimer	0.35	0.31	0.268	0.241	0.944	0.063	33.4

Table 1.2 Statistical Summary

	Platelet Count, 000's / μL				
	0-4	5-9	10-14	15-19	% < 10,000/μL
Express 3	11	20	7	2	78
Express 2	10	24	6	0	85

Table 2.1

Sample	Glucose		BUN		Creatinine		Albumin	
	SSX3	SSX2	SSX3	SSX2	SSX3	SSX2	SSX3	SSX2
1	81	83	17	17	0.9	0.8	4.3	4.3
2	92	92	20	19	1.0	1.0	1.9	1.9
3	108	108	11	11	0.9	0.9	3.8	3.8
4	90	92	12	12	0.9	0.9	4.1	4.0
5	93	92	9	9	0.5	0.5	4.5	4.4
6	83	84	13	13	0.9	0.8	4.2	4.2
7	101	102	15	15	0.7	0.7	3.8	3.9
8	82	82	16	15	0.8	0.8	4.3	4.3
9	83	84	9	9	0.8	0.8	4.0	4.0
10	131	132	16	16	1.0	1.0	3.7	3.7
11	115	116	14	15	0.9	0.8	4.0	4.0
12	93	90	10	10	0.8	0.7	3.8	3.8
13	95	93	15	15	0.6	0.7	4.0	4.1
14	86	88	18	18	0.8	0.8	4.4	4.3
15	100	97	12	12	0.8	0.8	4.0	4.0
16	81	84	15	15	0.9	0.8	3.7	3.8
17	102	100	10	10	0.9	1.0	4.2	4.2
18	137	152	16	16	0.8	0.8	3.9	3.9
19	86	85	14	14	0.9	0.9	3.9	4.0
20	93	95	14	15	0.8	0.8	4.1	4.0

Table 2.2

Sample	Total Protein		Calcium		Uric Acid		Total Bilirubin	
	SSX3	SSX2	SSX3	SSX2	SSX3	SSX2	SSX3	SSX2
1	7.2	7.2	9.6	9.8	4.0	4.0	0.5	0.5
2	6.2	6.1	8.0	8.0	5.8	5.8	0.4	0.4
3	6.8	6.7	8.9	8.9	5.3	5.2	0.6	0.5
4	7.4	7.3	9.3	9.3	3.6	3.6	0.5	0.4
5	7.7	7.7	10.2	10.0	4.0	3.8	0.7	0.6
6	7.2	7.2	9.8	9.8	6.5	6.5	0.7	0.6
7	6.8	6.9	9.2	9.2	4.7	4.7	0.5	0.3
8	7.2	7.1	9.6	9.7	3.8	3.8	0.5	0.6
9	7.5	7.4	9.6	9.6	4.5	4.5	0.5	0.6
10	6.9	6.9	9.4	9.4	5.8	5.9	0.8	0.7
11	7.3	7.4	9.5	9.5	6.0	6.0	0.7	0.7
12	7.1	7.0	9.6	9.6	3.2	3.2	0.7	0.7
13	7.5	7.6	9.7	9.8	3.8	3.9	0.8	0.9
14	7.6	7.5	10.4	10.4	3.9	3.9	0.7	0.9
15	8.0	8.1	9.6	9.5	3.8	3.7	0.6	0.7
16	6.7	6.9	9.2	9.4	3.6	3.6	0.7	0.9
17	7.4	7.4	9.4	9.4	5.0	5.0	0.7	1.0
18	7.3	7.2	9.0	9.0	5.7	5.8	1.4	1.2
19	7.0	7.1	9.1	9.2	3.6	3.6	0.6	0.7
20	6.9	6.9	9.8	9.7	3.5	3.3	0.4	0.5

Table 2.3

Sample	LDH		CPK		Alk. Phos.		SGPT	
	SSX3	SSX2	SSX3	SSX2	SSX3	SSX2	SSX3	SSX2
1	134	140	138	138	80	81	26	25
2	117	119	30	30	59	60	24	24
3	170	168	107	105	32	38	33	32
4	102	105	43	43	33	34	22	23
5	120	118	71	72	68	65	20	20
6	117	99	109	108	54	58	20	20
7	123	117	63	62	67	72	22	21
8	125	129	74	74	47	50	25	24
9	107	113	66	68	67	63	19	18
10	160	154	93	92	69	68	31	29
11	218	215	129	132	78	79	32	32
12	133	130	109	108	39	39	20	20
13	142	136	74	75	47	45	21	19
14	147	140	88	87	84	81	18	18
15	137	135	118	116	90	91	29	30
16	143	123	79	76	61	52	25	27
17	128	127	79	80	54	51	18	19
18	155	155	118	115	70	68	22	23
19	110	111	75	77	46	53	15	15
20	146	163	316	317	65	65	28	28

Table 2.4

Sample	SGOT		GGPT		Amylase		Na	
	SSX3	SSX2	SSX3	SSX2	SSX3	SSX2	SSX3	SSX2
1	23	21	10	14	74	73	136	136
2	10	11	15	12	120	121	140	140
3	24	25	22	21	76	77	136	137
4	17	18	16	15	71	70	136	137
5	18	18	10	9	90	91	138	138
6	20	20	22	21	57	58	139	138
7	19	19	15	13	92	90	140	139
8	33	33	16	20	95	96	133	134
9	15	14	10	11	53	52	139	139
10	31	32	22	21	73	74	136	137
11	62	63	66	67	36	39	139	139
12	14	15	12	14	74	71	138	136
13	19	19	11	12	114	111	137	138
14	20	19	18	20	55	56	139	140
15	34	35	43	40	73	69	139	138
16	17	17	12	13	86	86	135	137
17	18	19	19	17	93	94	138	136
18	15	17	17	17	75	73	139	138
19	14	13	15	14	66	66	137	137
20	18	19	23	16	57	56	140	139

Table 2.5

Sample	K		Cl		CO2		TSH	
	SSX3	SSX2	SSX3	SSX2	SSX3	SSX2	SSX3	SSX2
1	3.9	4.0	101	99	28	28	4.34	4.41
2	4.2	4.2	104	106	31	31	1.46	1.40
3	3.4	3.5	104	104	25	26	1.84	1.96
4	3.5	3.7	104	104	25	25	1.01	1.12
5	3.8	3.7	102	101	28	28	0.36	0.39
6	4.1	4.0	103	103	25	26	1.80	1.85
7	4.0	3.8	109	108	26	25	2.38	2.42
8	3.6	3.6	99	100	25	25	1.07	1.02
9	3.3	3.3	106	104	27	27	1.40	1.51
10	3.7	3.7	103	103	24	24	1.69	1.72
11	4.0	4.0	106	104	25	25	5.83	5.72
12	4.4	4.4	104	104	26	25	0.80	0.84
13	4.1	3.9	100	102	29	29	0.39	0.41
14	4.3	4.4	103	104	28	28	1.09	1.17
15	3.9	3.9	103	103	27	27	1.91	1.92
16	4.3	4.6	104	105	26	26	3.81	3.68
17	4.0	4.0	102	101	28	28	1.31	1.46
18	3.3	3.4	101	102	29	27	2.05	2.27
19	4.1	4.0	103	105	27	27	1.54	1.71
20	3.7	3.5	107	104	26	27	3.55	3.74

Table 2.6

Sample	T4		CKMB		Troponin		PT	
	SSX3	SSX2	SSX3	SSX2	SSX3	SSX2	SSX3	SSX2
1	8.47	8.35	1.5	1.6	0	0	12.4	12.4
2	8.47	8.12	1.6	1.5	0.02	0.01	12.0	12.1
3	9.79	9.49	1.1	1.1	0	0.01	12.0	11.8
4	8.73	8.71	0.9	0.9	0	0	12.0	12.0
5	8.73	9.00	1.2	1.2	0	0	11.5	11.2
6	9.33	8.52	1.5	1.4	0	0	10.9	10.9
7	9.85	9.91	1.2	1.2	0	0	11.8	11.6
8	6.81	6.25	1.9	1.8	0	0	11.3	11.2
9	8.39	8.16	1.1	1	0	0	11.6	11.5
10	7.74	6.95	0.9	0.9	0	0	12.2	12.0
11	7.07	6.87	1.6	1.6	0	0	11.5	11.7
12	5.64	5.88	3	3.2	0.01	0	12.3	12.2
13	11.04	11.16	2	1.9	0	0	12.1	12.3
14	7.93	8.22	2.7	2.8	0	0	11.8	11.9
15	11.31	11.57	2.1	2.1	0	0.01	12.4	12.5
16	7.62	6.69	0.9	0.8	0	0	12.8	12.5
17	12.11	12.34	1.2	1.3	0	0	12.5	12.6
18	6.45	5.83	4	4	0	0	12.5	12.4
19	6.11	6.43	0.8	0.8	0	0	11.8	11.7
20	6.30	6.13	4.5	4.4	0	0	14.3	14.1

Table 2.7

Sample	PTT		D-Dimer		Platelet		Platelet	
	SSX3	SSX2	SSX3	SSX2	SSX3	SSX2	SSX3	SSX2
1	33.1	32.6	0.37	0.33	10	5	7	7
2	23.6	23.6	1.24	1.13	3	9	10	8
3	28.7	27.7	0.56	0.49	7	8	9	8
4	27.9	28.4	0.17	0.14	6	6	2	8
5	22.8	22.7	0.00	0.10	7	9	11	10
6	26.9	27.2	0.63	0.31	8	4	5	7
7	27.2	26.9	0.34	0.38	9	10	4	9
8	24.9	24.6	0.18	0.21	9	6	13	11
9	27.4	27.0	0.26	0.14	3	10	1	7
10	26.0	25.8	0.28	0.29	1	5	1	4
11	25.0	24.9	0.52	0.43	15	8	12	10
12	27.3	27.0	0.41	0.42	2	3	6	3
13	25.5	25.1	0.16	0.16	5	3	3	6
14	30.1	29.7	0.28	0.24	5	7	4	7
15	26.7	26.6	0.57	0.61	5	6	7	7
16	29.2	29.4	0.11	0.12	3	2	5	3
17	28.2	28.8	0.23	0.11	5	4	5	8
18	26.5	26.7	0.26	0.26	11	3	11	5
19	28.7	28.9	0.16	0.07	5	9	7	10
20	25.5	25.9	0.25	0.25	19	8	5	3

Chart 3.1

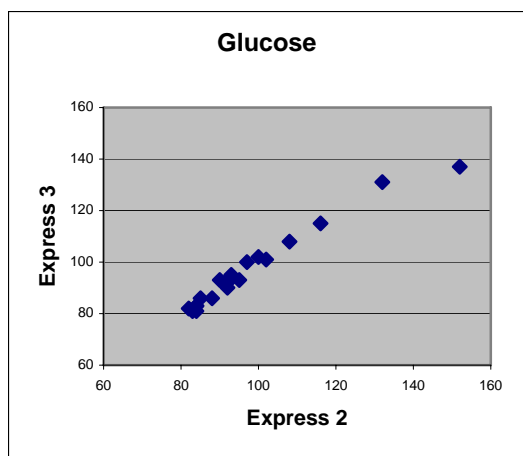


Chart 3.2

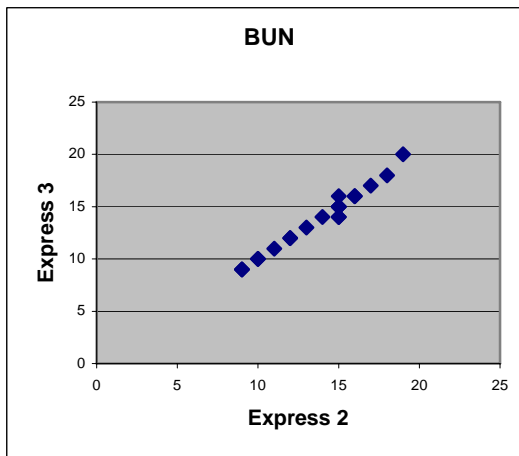


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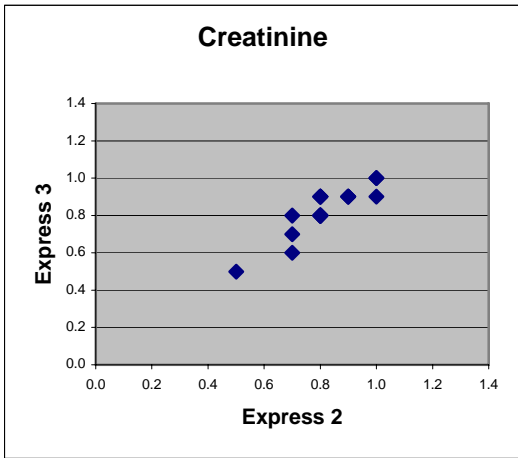


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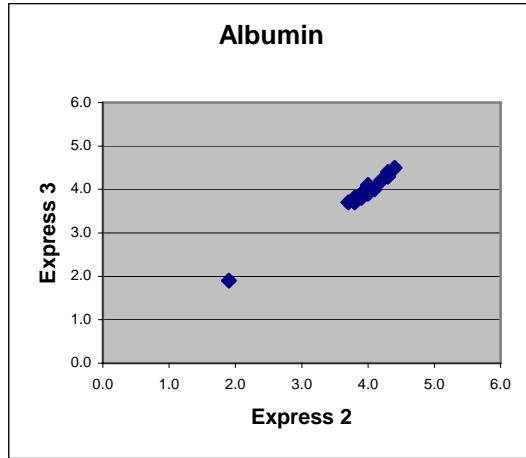


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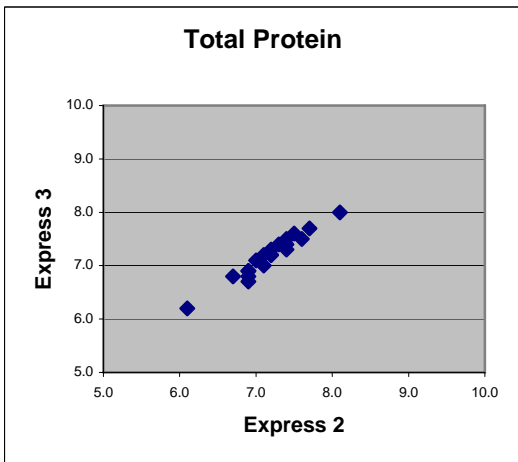


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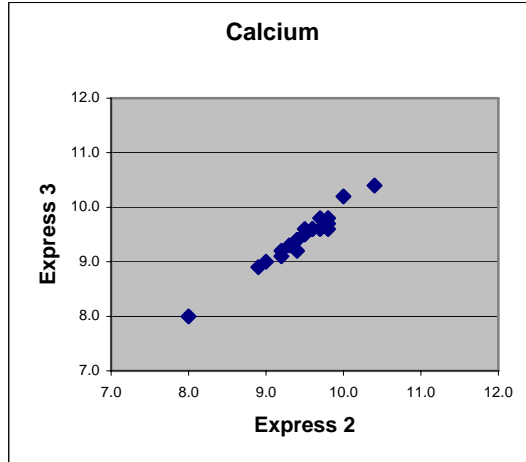


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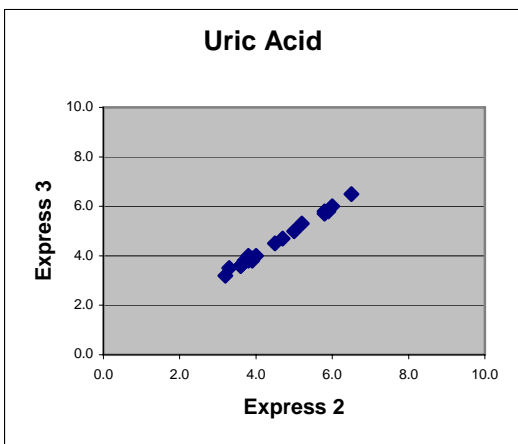


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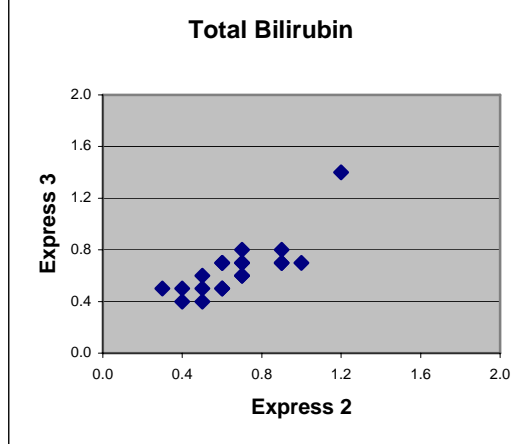


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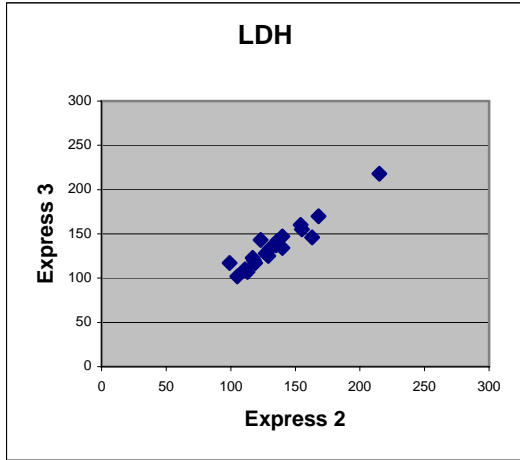


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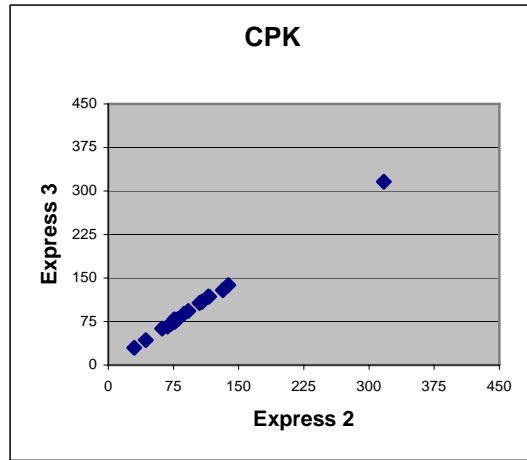


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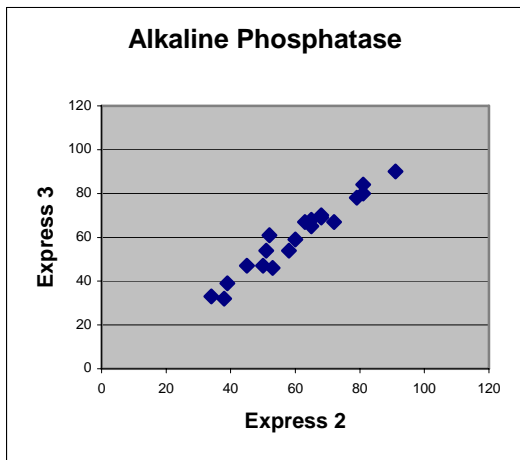


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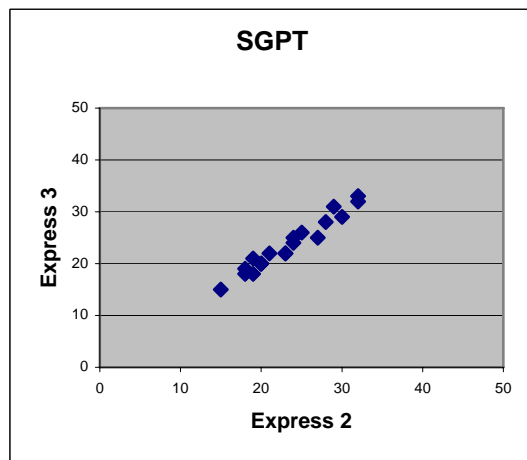


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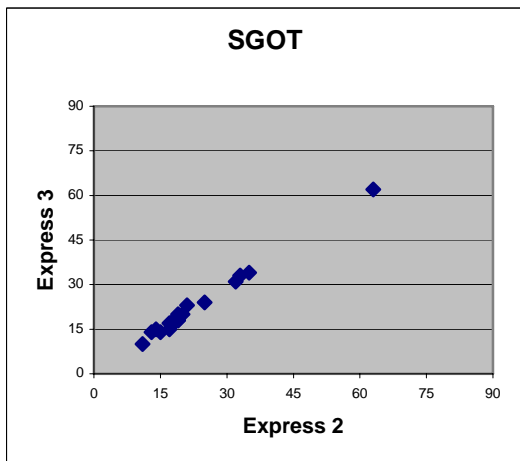


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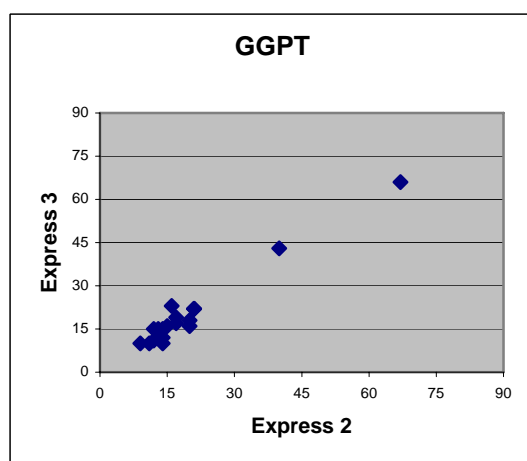


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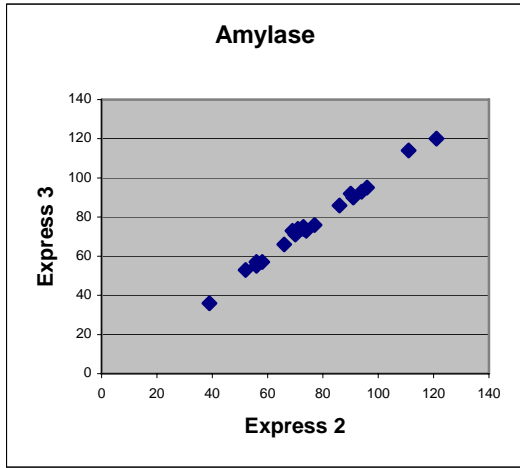


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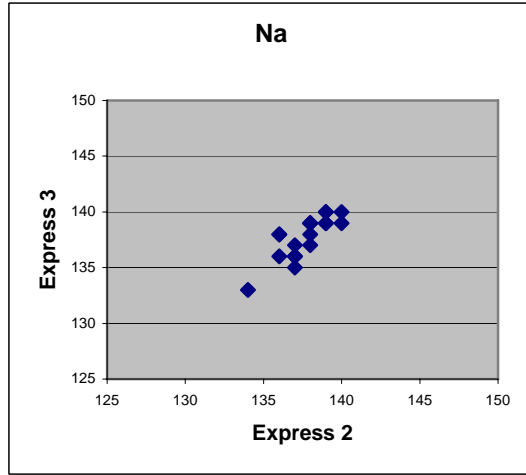


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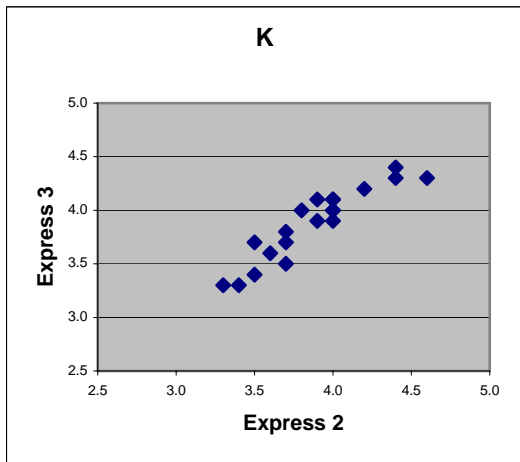


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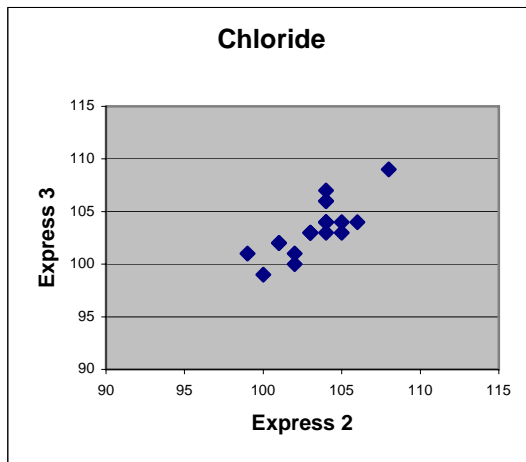


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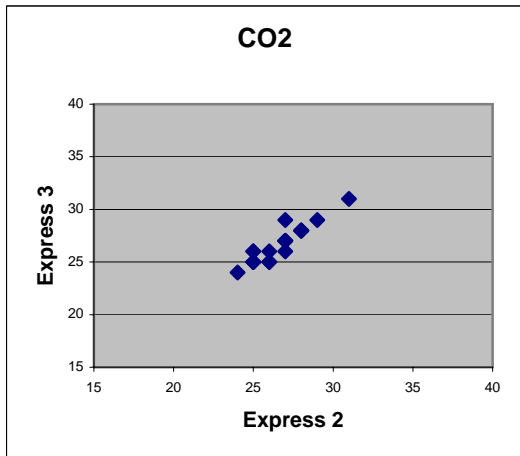


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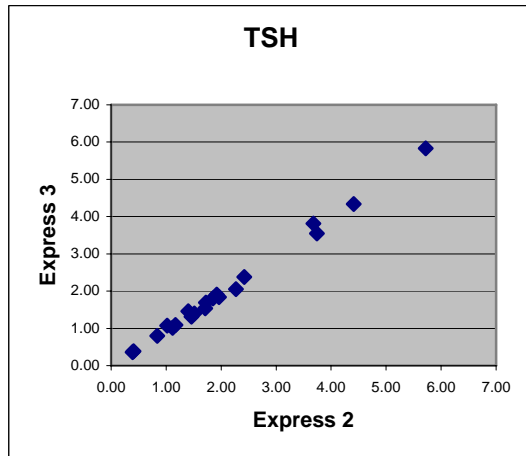


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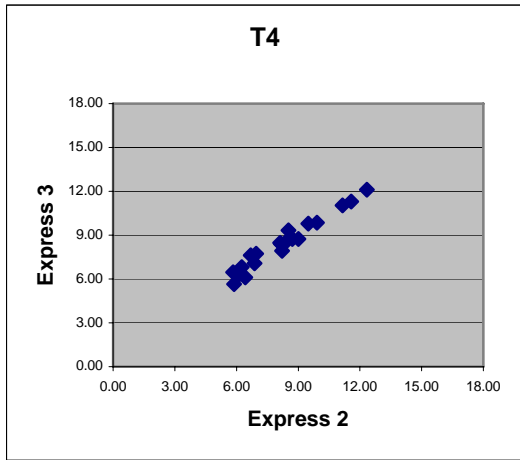


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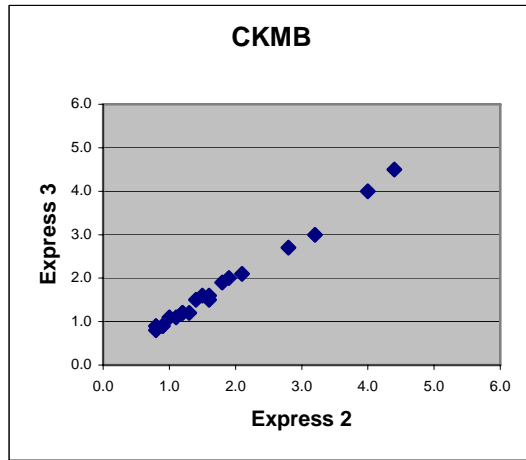


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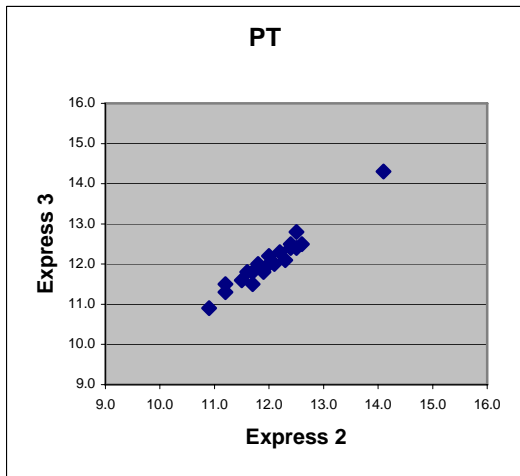


Chart 3.24

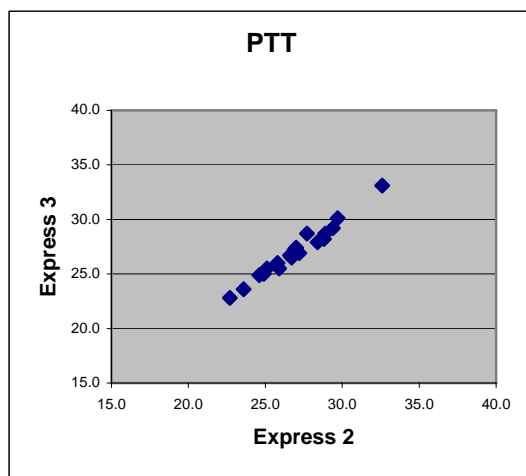


Chart 3.25

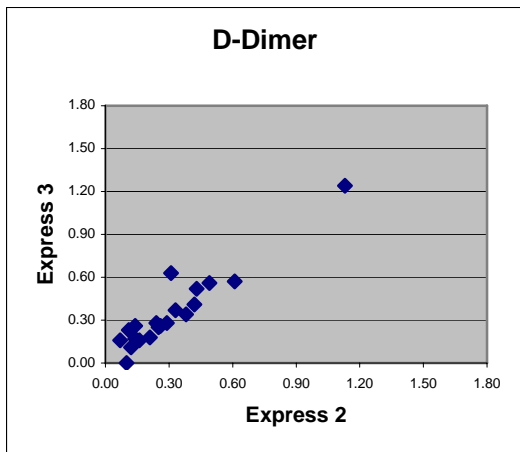


Chart 3.26

